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Steel Castings Technical Conference

The first technical conference of the British Steel Founders' Association, held in Sheffield last week-end, was of more importance than most conferences of this type, because of the high percentage representation. Without consulting works of reference, we can only remember one firm which was not directly or indirectly represented, whilst most concerns had several delegates. Moreover, the technical organisation of the Association at the moment rather resembles an attractive debutante. For the major research interests, it is not without a dowry, has intellect, and all the attributes of an attractive *parti*. The only drawback, from the research angle, is that she is no virgin; she is very much a woman of the world and is in a position to evaluate the outcome of any matrimonial overtures, as against an existence of wayward freedom. The conference and private meetings held no doubt helped to direct the divergent views of members into some sort of focus.

About 150 delegates participated, and the conference acquired due recognition of its importance by the presence at the high table of the inaugural banquet, of the Lord Mayor of Sheffield, the Master Cutler, and the Parliamentary Secretary to the Minister of Supply (Mr. W. Leonard, M.P.). Research interests were represented by Sir Charles Goodeve (director of the British Iron and Steel Research Association) and Mr. J. G. Pearce (director of the British Cast Iron Research Association). Moreover, a civic reception was accorded to the delegates by the Lord Mayor and Lady Mayoress at the Town Hall. The president of the Association (Mr. Charles S. Gill) in a brilliant speech, left his hearers in no doubt as to what the intentions of the Association and the industry were; and equally ably did Sir Charles Goodeve and Mr. Pearce sketch in just how their organisations could provide such facilities as would approach perfection. Yet the speech of the evening came from Mr. Tom Makemson, who was deputising for Mr. D. Howard Wood (President of the Institute of British Foundrymen). His prolonged association as a director with the Ministry of Supply enabled him to speak with profound knowledge of the present position of the foundry industry and its standing in Government circles.

The brilliant organisation of the conference permitted each delegate to participate in two works visits, and to take part in a like number of round table discussions. These were presided over by Mr. Basil Gray, the chairman of the main technical committee. He has been wise to organise his sub-committees on a regional basis and not by technical interests. This has resulted in the Yorkshire and Lancashire members producing an outstandingly valuable report on the various sand mixtures they use. No recommendations were offered, but it was plain for all to see that the costs per ton of finished castings varied very considerably, and potential economies were clearly indicated. The second session gave attention to a report by Mr. L. W. Sanders and Mr. C. Howell Kain on fluidity and temperature. The final session, addressed by Mr. Gray, was rightly devoted to future activities. It was pleasing to note that as the conference reached it climax there was a crescendo of enthusiasm. The visits to the works had revealed the influx of orders for new types of castings; the tendency to lighter sections; the growing extension of cored work, whilst the younger foremen, metallurgists and chemists, because of the general good fellowship existing, felt a new importance *vis-à-vis* the industry they served. They will return to their duties with an added enthusiasm for their calling, and this, above all, was the main objective of the conference.

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ENGLISH STEEL CORPORATION

THREE NEW DIRECTORS APPOINTED

English Steel Corporation, Limited, announce the appointment of three new directors, Mr. B. Gray, Mr. W. D. Pugh and Dr. C. J. Dadswell.

Mr. Gray served his apprenticeship at Vickers Works, Sheffield, and has been associated with many branches of the company's activities. In 1934 he was appointed superintendent of Grimesthorpe Works. During the war, Mr. Gray was chairman of the tank castings design committee under the Iron and Steel Control, and was responsible for the production of many special types of steel castings for war purposes. Mr. Gray is chairman of the research association of the British Steel Founders' Association, whose first convention was held in Sheffield last week. Mr. Gray was appointed a special director of the Corporation in January, 1945.

Mr. W. D. Pugh was appointed a special director in January, 1945, and is a director of Darlington Forge, Limited, and Oughtibridge Silica Firebrick Company, Limited. Educated at Regent Street Polytechnic, after gaining practical experience with John Lysaght, Limited, Scunthorpe, he spent three years at Sheffield University, where he obtained the Associateship in Metallurgy and Mappin Medal. In 1926 he joined the research department, Vickers Works, and later visited metallurgical plants in Germany, Italy, France, and the United States. Mr. Pugh was superintendent of Darlington Forge, Limited, from the reopening of the works in 1936 until his return to Sheffield in 1945.

Dr. Dadswell was educated at University College, London, and at Brighton Technical College, and is a Ph.D., B.Sc.(Eng.), M.I.Mech.E., Ingenieur E.S.F. Winning the Robert Blair Travelling Fellowship, he studied at the Foundry High School, Paris, and became a steel-foundry manager at an early age. For a period during the war, Dr. Dadswell was seconded to the Ministry of Supply, being responsible for the adaptation of foundries for the manufacture of tank parts, and was chairman of a Ministry of Supply mission to the U.S.A. to study tank armour. On his release by the Ministry he became superintendent of drop forge production, and in January, 1945, was appointed special director in charge of the drop forge, foundry and spring departments of the Corporation.

MIDLAND IRONFOUNDERS' ASSOCIATION

Mr. D. Howard Wood, the President of the Institute of British Foundrymen, has been appointed independent chairman of the Midland Ironfounders' Association. He replaces the late Mr. A. E. Hurst, who was chairman from the inception of the Association in 1936. Mr. Hurst saw its membership grow from 20 to over 160, which makes it the largest area association in the country. The new chairman is chairman and managing director of the Constructional Engineering Company, Limited, managing director of E. Tallis & Sons, Limited, and the Adaptable Moulding Machine Company, Limited.

FROM THE BACK-BENCHERS

Prior to the start of the Autumn session of the London branch of the Institute of British Foundrymen, the president, Mr. G. R. Webster, sent to every member a letter in which he asked for suggestions directed towards increasing the interest and usefulness of the ordinary meetings. The response though small was interesting. One member believes that the re-institution of a Brains Trust would be popular. Several comment on the short Paper competitions, and it so happens that the changes suggested have been envisaged and adopted by the branch council. Thus the Papers submitted will be scrutinised by a sub-committee and three or four will be selected and read by the authors; voted upon and discussed. A member wishes for a discussion on non-ferrous test-bars and even volunteered to introduce the subject himself. He did not believe that when Mr. Hudson presented the Report at the Birmingham conference, the last word had been said. One of the many metallurgists amongst the membership wanted a further Paper on the "lost wax" process; and others "on the use of heat-insulating pads and risers of gypsum for non-ferrous castings and "thermit" charges in blind risers for the development of heat and pressure to improve feeding."

An East Anglian member, having had experience of local success suggests the organisation of symposia on definite subjects, drawing the contributors from diverse types of foundries. This has much to commend it. Several members would welcome preprints of the Papers selected in order to give more preparation for and time to the discussion. As soon as the Paper shortage becomes less acute, there is no reason why lectures lending themselves to such treatment should not be supplied is advance to those desiring them.

Finally, there was a grouse. The owner of a modest foundry concern, objects to the too frequent selection of members connected with the equipment and supply concerns for the duty of thanking lecturers on behalf of the members. He considers that those actually concerned in the running of the industry should be delegated for this task.

Thus there was nothing very revolutionary suggested, and curiously enough, although it is well known it exists, there is not a single demand for Papers of a more practical character.

SHEEPBRIDGE STOKES CENTRIFUGAL CASTINGS COMPANY, LIMITED, announce that their telephone number has been changed to Chesterfield 5471.

FOUNDRY PRACTICE—the house organ of Foundry Services, Limited, of Long Acre, Nechells, Birmingham, 7, in its July-August issue, has a further instalment on the application of asbestos in the foundry. It also carries short articles on "Lead-bronze and Copper-lead Linings for Bearings," cupola practice and the "Removal of Sand from Castings by Pickling."

DEVELOPMENTS IN CUPOLA PRACTICE

(*Continued from page 94*)

Perlit Iron

Mr. Longden's Paper gave many valuable details about several of these attempts. The Schuerrmann cupola was highly intriguing; why its performance was no better than it was remained a mystery. Mr. Longden's hot-blast cupola he had seen but never had the privilege of trying out. On one point he was inclined to differ from much of the modern talk; it was this. In the days of Lanz Perlit iron, containing 0.5 per cent. silicon and 0.25 per cent. phosphorus, he had to produce superheat sufficient to make that iron run intricate castings, even though it was stored in a receiver before being tapped into the ladle. Personally, he designed his own cupola—a very simple affair. Anyway, the Perlit licensees all managed to tap their iron somewhere between 1,450 and 1,500 deg. C. and ever since he had been able to tap iron in this range of temperature, *and he did not want it any hotter*. Therefore, so far as he was concerned, he was interested only in advantages other than the obtaining of hotter iron. Admittedly this was a personal point of view but a very real one nevertheless. All this was not to say for one moment that he was not highly interested in hot-blast cupolas; one of these days somebody, probably some extremely unlikely person, like an accountant or a dress-designer, would present the industry with a hot-blast cupola which would work docilely and with a valuable increase in efficiency. Up to now that did not appear to be the case, judging by the lack of commercial progress made by any hot-blast cupola. To-day, with fuel so scarce, Mr. Longden had done a service by presenting the subject so concisely, and so impersonally introducing his own hot-blast cupola.

Control of Composition and Melting

Mr. Young went on to say that the Paper on balanced air feed in the cupola ignored the mass of knowledge whereby fine control of composition and melting was attained 25 and more years ago in the majority of the first-class ironfoundries of Europe and America. The hypothetic defects alarmingly depicted in Fig. 1 were untrue of scientifically-controlled cupolas; if and when occurring in other cupolas they could be simply and inexpensively rectified. Flaring of cupola shafts was an old-time story. Substantial additions of coke breeze to ganister in order to vent it and stop it "spalling" had been daily practice for the six years the speaker's present foundry had been under his control; and he was very sure it was not his original idea. The Author's melting sheet for March 12, 1946, shown in Fig. 10, indicated on the left-hand side that they used an iron-to-coke ratio of 8 to 1 for a no-steel mixture, but many people used no more coke than this for a mixture containing 25 to 30 per cent. steel. This melting sheet did not give the height of the coke-bed, a relevant factor; it showed, however, the position of maximum wear as 13 in. The term "balanced" having become very intimately associated with the cupola air-blast arrangement invented by the late Mr. J. E. Fletcher, savoured a little of plagiarism when used in the title of this Paper. Although the Authors departed from the question of their special cupola in order to discuss ganister, the fact remained that the Paper was about the former, as its title stated. They advocated six blast pipes, each capable of being regulated according to the fluctuations, showing, at any moment during the run, on an instrument possessing 12 indicators, six for pressure, six for volume. That the six pressure-indicators would bob up and down no matter what one did, seemed to be admitted, so why have them? Obviously the objective was to keep the six volume-indicators in a straight line all the time. This called, without doubt, for an accurate observer in attendance on the instrument and on the controls with which each of the six blast-pipes was equipped. Obviously, also, all depended upon the reliability and constancy of the instrument in each of its many functionings. The Paper tended to give the impression that the cupolas of standard makers were inferior. The speaker had had to make function efficiently and accurately all, or almost all, British makes of cupolas and had not found one he could not control within a fortnight and without modification.

It might be that the Authors' cupola possessed advantages which the speaker had failed to grasp, but Fig. 1, and the first five paragraphs of their Paper, plus remarks about flaring, ganister, and so on, did not assist an outsider to form a clear picture.

AUTHORS' REPLY

The Authors did not agree with Mr. Young's statement that they ignored the mass of knowledge available on cupola control. They specifically stated that all other known methods of close control were necessary to get the best out of Pari-Blast, and to attempt to apply this principle without 100 per cent. attention to these points would result in a complete waste of time and money on plant equipment. They stated that the idea of flaring the cupola was at least 80 years old, so they had to agree that it was an old-time story.

They were fully alive to the fact that coke in ganister had been used by a number of foundries with beneficial results for many years; and in view of the fact that Ronceray was mentioned as having used a coke mixture over 20 years ago they could not see how they had inferred that they were the originators of this idea, and suggested that these statements would not have been made if the Paper had been read more carefully.

The air flows shown in Fig. 1 were not hypothetic, but were the result of readings taken from a modern cupola made by one of the leading manufacturers;

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in view of the experiments carried out by the Authors they could not agree that these defects could be easily rectified for the simple reason that air flows were assumed to be equal in the absence of precise knowledge.

It was not disputed that many foundries ran coke ratios of 8 to 1 when using steel mixes of 25 to 30 per cent. steel; but they considered that for the class of metal melted, and from the temperatures obtained they were running very efficiently.

Daily Check on Coke Bed

The charged coke bed was maintained at 3 ft. 6 in. and checked daily with a measuring stick by the metallurgist or his assistant, and the degree of lining wear varied the amount of coke charged in the bed. This wear was noted separately on the cupola report sheet. "Equal-Blast"—"Equi-Flow" "Iso Blast"—could have been used. Pari-Blast on the title of the Paper might not be acceptable, and despite anything that Mr. Young might think, he could not dispute the fact that the air feed was balanced.

They did not feel it necessary to apologise for bringing in the question of ganister, as the investigation on linings was a direct result of increased wear owing to the greater temperature obtained from the Pari-Blast cupolas, and felt that it was of general interest.

Six tuyeres were not advocated on a small cupola. This particular cupola was built before experiments were complete, and the tuyere arrangements were recommended by the maker. Under the present arrangements four tuyeres were ample. Foundry workmen, as mentioned in the Paper, could be trained to take an interest in the instruments; they did a good job of work at the Authors' foundry, and it had not been found necessary to employ more people on the furnaces.

There were reliable instruments available: they could, and were, checked periodically. The chart recorder registering total readings was used frequently to check up the separate flowmeters adjacent to the cupolas.

Individual impressions were bound to vary and in answering this comment, the Authors stated that the Paper was based on what has been achieved, and they have tried to avoid theorising, but put down the practical developments of this particular improvement. In thanking Mr. Cook for his kind remarks, Mr. Taft, on behalf of the Authors, acknowledged the fact that Mr. Cook was the originator of the "K" Bar and apologised for the omission.

Written Contribution

MR. F. K. VIAL (Griffin Wheel Company, U.S.A.) wrote that great credit was due Mr. Longden for outlining the economics of cupola practice, and not only for his contribution to the literature of hot blast, but also for his practical demonstration of a method of substituting gas house coke for upwards of 50 per cent. of the standard foundry coke ordinarily required—no mean accomplishment. The Author has pointed out that, aside from the economics of the subject, it is the patriotic duty of the industry to conserve the nation's fuel supply and, further, that using an unnecessary amount of fuel becomes wanton waste which is not justified from any viewpoint. Civilisation has been entirely too wasteful of Nature's resources.

Mr. Vial went on to write that there was nothing more obvious than that cupola practice in general was not standardised; and so there was a wide range in the amount of coke used for melting 1 ton of iron in various cupolas of the same design, melting an identical product. A large field has thus become open to research, the objective of which has been to provide reliable records of the basic fundamentals upon which improvements in thermal efficiency and quality of production could be based. Early in his Paper the Author made several observations regarding the many attempts that have been made to improve cupola practice by modifications in design, the most successful of which were the Poumay cupola and the Fletcher balanced-draft cupola. These have been important in pointing the way to still greater efficiencies. A timely precaution was made in the Author's statement that, "from time to time extravagant claims for high efficiencies are attributed to special modifications of the cupola and that such claims, usually, are not well substantiated." This conclusion was all too obvious and applied equally well to books of reference which, when discussing cupola efficiencies, almost without exception made general statements, with no substantiating data to support them; consequently they were of limited value. There was thus but one course to follow in a search for increased efficiencies, that being to closely observe tests of any proposed improvement and record all items regarding coke ratios, temperatures of iron, rate of melting, percentage of CO_2, and temperature of effluent gases. The study of these records would determine to what extent improvements have been secured and whether they were brought about by a modification in design or by closer attention to operating details. Cupola practices in the majority of cases were subject to more or less improvement without changing cupola design.

Charts and Heat Balances

The object in entering into this discussion, wrote Mr. Vial, was to reinforce Mr. Longden's plea for more definite charts and heat balances definitely to point out the laws governing cupola efficiencies. These were not available at the present time. Charts Nos. 3 and 4 of the Paper represented a start along this line. They indicated the approximate variation in results that could be obtained from any iron-to-coke ratio in combination with various air volumes per min. per sq. ft. of cupola area. In general, these two charts indicated that increasing the air flow increased the per cent. of CO_2; consequently, the heat developed per lb. of coke was increased and the temperature of the iron melted was increased, or, if desired, the molten iron could be maintained at the same temperature with an increased iron-to-coke ratio. In either case the rate of melting was increased.

Limit of High Blast

The limit of high blast was when the percentage of CO_2 exceeded 13 per cent.; a greater concentration of the oxidising agent CO_2 would result in excessive oxidation of silicon and manganese. The reverse conditions were obtained by reducing the flow of air, when no change in the iron-to-coke ratio was made. The object of Charts Nos. 1 and 2 was to show the distribution of heat under various melting conditions and visualised the large percentage of sensible and undeveloped heat in the effluent gases which at present was wasted and was simply awaiting the thoughtful analysis of ways and means for its recovery, by developing its potential heat and conveying it to the cupola below the melting zone. This waste heat amounted to approximately 50 per cent. of the total heat of the fuel which can be seen to burst into flame and roar up the stack, all to no purpose. The methods of analysis are well stated by the Author under the subject, "Efficiency Factors," in which he points out that each zone of the cupola should be analysed separately.

Books of Reference.—Unfortunately, books of reference on cupola practice were of little value in giving detailed assistance in ways and means of building up thermal efficiencies. The texts were mostly mere generalities with respect to combustion and contained so many myths and fables that the intermingled truths could not be separated.

Height of Cupola.—For example, most authorities made the statement that increasing the distance between the top of tuyeres and the charging sill increased the amount of preheating, lowered the temperature of effluent gases, and consequently increased cupola efficiency. This conclusion was not based on sound reasoning, nor could it be demonstrated by experiment.

If a cupola was so designed that approximately one hour's time elapsed between the time a charge was placed in the cupola and the time it was completely melted, or, to be more specific, if the charge of iron had been preheated to 1,090 deg. C. at the time it entered the melting zone, then no further increase in the heat of the cupola could improve the thermal condition. The gases used for preheating were below the temperature of melted iron; consequently all the heat in the world at a temperature of 815 deg. C. could not melt a pound of iron, and if the charge about to be melted had attained a preheat of 1,090 deg. C., no further efficiency could be secured by increasing the depth of material subject to reheating. A height of 14 to 16 ft. above the tuyere was sufficient for ordinary melting stocks. Any greater height would develop inconveniences rather than improve conditions.

Tuyere Areas

Another item of misleading recommendation was in regard to the relation of tuyere area to the cross-sectional area of the melting zone. It should be remembered that tuyere area within the limits of ordinary practice did not control blast pressure. The size of a tuyere could be doubled and still deliver no more air, because the air volume was regulated by the pressure developed within the cupola to force the necessary volume of gases per minute through the charges. This pressure was nearly constant across the cupola area; consequently the upward flow of gases from circumference to centre was nearly uniform, except that the voids may have been greater next to the lining than at the centre of the cupola. If this was the case, the larger free orifice per sq. ft. would carry the greater volume. The air blast was carried to the centre of the cupola because the pressure at the centre drove the gases upward, and it was necessary for the blast from the tuyeres to supply the upward flow in order to maintain the pressure. There was no difficulty in blast reaching the centre of cupolas at least up to 8 or 9 ft. in dia. It was not necessary to develop velocity from the tuyeres to drive the blast to the centre. This was a rather far-fetched conclusion for ordinary practice, for it would be necessary to make the tuyeres very small in order to increase the velocity, and, even so, the coke immediately in front of the tuyeres would destroy the energy of velocity, adding to the turbulence near the lining at a point where such action was most undesirable. Continuous tuyeres were apparently desirable for cupolas of small diameters, while individual tuyeres were preferable for cupolas of large diameters. The question of scaffolding and burning out the brick lining were the features to be observed in determining the size of tuyere openings rather than any consideration of driving the air to the centre of the cupola.

Height of Bed Coke

It was usually stated that the height of the bed was of extreme importance in good melting practice, and yet nothing has been said about the height of bed coke during prolonged heats. The initial height of the coke in the bed was in excess of melting requirements for the simple reason that a charge or two of coke was necessary for preheating the coke charges and for bringing the walls of the furnace up to the uniform operating temperature, and when the iron-to-coke ratio was fixed and the air flow was constant, Nature fixed the height at the point where the burning away of one charge of coke exactly synchronised with the melting of a charge of iron.

The operator was powerless to change this balance under normal operations; if an extra charge of coke was placed in the cupola, it would simply raise the bed temporarily, increasing the CO percentage in the gases, which meant that the coke was rapidly burned, producing a minimum amount of heat until the balance was once again restored.

Heat Recovery

Another criticism of the authors of cupola literature was their failure to consider the underlying principles of the hot blast as a means of controlling cupola efficiencies. Until 20 years ago all foundry metallurgists of international reputation laid down the rule that hot blast was not applicable to cupola operations. Notwithstanding these conclusions, the hot blast has been very successful in many installations in demonstrating a decided advance on cupola efficiency. Yet, in spite of these commercial demonstrations, the latest books on

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cupola practice refrained from any analysis whatever of the basic facts underlying the recovery of 40 to 50 per cent. of the total heat that was now being wasted. If one awaited the conclusions of the authors of cupola literature regarding the possibility of increasing cupola efficiency from 35 to 60 or 70 per cent., one would make no start in that direction.

Mr. Vial stated that it was not the purpose of his contribution to discuss cupola design or operation. The above points were mentioned simply to show how far text-book literature was behind the actual operations which were in daily practice. It might be well if one followed the Einstein idea "that the greater part of what we know is not true."

In order to present the possible increase in efficiency through the agency of hot blast, a statement of the thermal balance of the reactions taking place within the cupola was desirable as an interpretation of the various parts of the four charts above mentioned. A statement of the heat balance was just as essential to establish a true condition of cupola operations as a financial balance was necessary to a knowledge of the financial standing of a company.

This involved:—(1) The laboratory determination of the calorific value of 1 lb. of coke; (2) the coke-to-iron ratios; (3) the temperature of the iron when tapped, and (4) analysis and temperature of effluent gases. From this information the entire heat balance could be calculated and was very informative regarding the total potential heat of the fuel and its distribution to the various purposes within the cupola.

As an illustration, the following four heat balances covered the entire range of cold-blast and hot-blast practice, and clearly indicated how cupola efficiency could be increased from a low of 30 per cent. to a high of 66 per cent.

These heat balances referred to fuel economy only. There were other items in any test run that should be recorded. Among these, as pointed out by Dr. MacKenzie, were:—(1) The ratio of air to iron melted; (2) CO_2 ratio to iron melted; (3) silicon and manganese loss (it is always extravagant to save coke by substituting these elements for fuel); (4) iron loss by oxidation; (5) refractory consumption for patching, and (6) life of cupola blocks used for lining.

It was not the writer's purpose to recommend any procedure, but simply to act on Mr. Longden's suggestion that foundrymen should not be misled by mere statements of an enthusiastic salesman. On the other hand, there was even more danger of becoming so familiar with the daily observation of large heat losses that they became callous toward improvements; heat losses of large magnitude were prone to be passed by without notice.

Taking the proper attitude, it should have been realised that upwards of 50 per cent. of the potential heat of the fuel was wasted which could be recovered—with large dividends—if the proper thought and attention were concentrated on the problem. Each installation became a study in itself as to what extent it could afford to overlook a saving of three or four shillings per ton of fluid iron furnished the foundry. A very common statement everywhere was that in "our case any saving would cost more than it comes to." Such an attitude would put an end to any consideration of the economics of the problem.

The application of hot blast to small installations doubtless was of far greater advantage than was now conceded. There were many opportunities for committing errors in the development of new devices, hence as a starter, wherever possible, a new installation should

TABLE I.—*Heat Developed by 1 lb. of Coke.*

	Cold Blast.		Hot Blast.	
Lb. melted per lb. coke ..	7	11	11	16
Potential heat 1-lb. coke (B.Th.U.)	13,000	13,000	13,000	13,000
Per cent. CO_2 in effluent gases	11.0	15.0	11.0	15.0
Lb. of coke:				
For melting 1 ton iron..	286	182	182	125
For complete combustion (CO_2)	190	139	129	103
For reduction CO_2 to CO	96	43	53	22
Lb. of air:				
Per lb. iron melted ..	1.05	0.76	0.71	0.57
Per lb. coke burned to CO	11.03	11.03	11.03	11.03
Per ton iron melted ..	2,094	1,531	1,427	1,133
Lb. of gases:				
Per lb. iron melted ..	1.18	1.85	0.79	0.62
Per ton iron melted ..	2,351	1,695	1,591	1,245
B.Th.U. developed per lb. coke:				
In combustion zone ..	8,700	10,000	9,300	10,760
Sensible heat from preheating coke ..	1,260	1,260	1,260	1,260
Sensible heat from blast preheated to 426 deg.	—	—	1,580	1,820
Total B.Th.U. in combustion zone ..	9,960	11,260	12,140	13,840
Temperature—deg. C.)—of gases in combustion zone	2,120 deg.	2,120 deg.	2,455 deg.	2,455 deg.
Temperature 1,371 deg. and below, for preheating only	1,371 ,,	1,371 ,,	1,371 ,,	1,371 ,,
Above 1,371 deg., for melting	749 ,,	749 ,,	1,065 ,,	1,065 ,,
B.Th.U. loss, CO_2 to CO	1,760	1,250	1,520	940
Net B.Th.U. developed 1 lb. coke	6,940	8,750	7,800	9,820
Potential B.Th.U. not developed	6,060	4,250	5,200	3,180
Total potential	13,000	13,000	13,000	13,000
Temperature of iron (deg. C.):				
Fluid iron in melting zone	1,204 deg.	1,204 deg.	1,204 deg.	1,204 deg.
Iron at tapping hole ..	1,532 ,,	1,437 ,,	1,543 ,,	1,471 ,,
Degrees superheat ..	328 ,,	233 ,,	339 ,,	267 ,,
B.Th.U. transferred to iron:				
In fluid iron as melted..	3,040	4,770	4,770	6,940
In superheat	950	1,065	1,550	1,770
In iron as tapped ..	3,990	5,835	6,320	8,710

TABLE II.—*Distribution of Heat Developed by 1 lb. of Coke.*

	Cold Blast.		Hot Blast.	
Lb. of iron melted per lb. coke	7	11	11	16
B.Th.U. transferred from gases :				
In combustion zone—				
Superheating iron	320	360	515	590
Formation and superheating slag	520	400	530	390
Total	840	760	1,045	980
Temperature of gases delivered to reducing zone	1,910 deg. C.	1,948 deg. C.	2,143 deg. C.	2,171 deg. C.
B.Th.U. transferred in reducing zone :				
Superheating iron	630	710	1,030	1,180
Preheating coke	235	235	235	235
Superheating slag	250	220	270	210
Reducing CO_2 to CO	1,310	930	1,130	700
Total	2,425	2,095	2,665	2,325
Temp. of gases delivered to melting zone	1,582 deg. C.	1,682 deg. C.	1,787 deg. C.	2,448 deg. C.
B.Th.U. transferred in melting zone :				
Latent heat of fusion	500	790	790	1,150
Preheating iron	240	375	375	545
Preheating coke	245	245	245	245
Superheating slag	110	110	160	160
Total	1,095	1,520	1,570	2,100
Total B.Th.U. delivered to combustion zone	9,960	11,260	12,140	13,840
Total B.Th.U. transferred below preheating zone	4,360	4,375	5,280	5,405
Balance to preheating zone	5,600	6,885	6,860	8,435
Temp. of gases delivered to preheating zone	1,365 deg. C.	1,432 deg. C.	1,510 deg. C.	1,410 deg. C.
B.Th.U. transferred in preheating zone :				
Preheating iron	2,300	3,600	3,610	5,250
Preheating coke	780	780	780	780
Calcining limestone	370	370	490	490
Reducing CO_2 to CO	450	320	390	240
B.Th.U. to preheater	—	—	780	1,320
Total	3,900	5,070	6,050	8,080
B.Th.U. in effluent gases :	1,700	1,815	810	355
Temperature of gases	443 deg.C.	415 deg.C.	321 deg.C.	160 deg.C.
Cupola efficiency, per cent.	30.7	44.9	48.6	67.0
Loss : incomplete combustion	46.6	32.7	34.0	20.7
Loss : slag and miscellaneous	9.6	8.4	11.2	9.6
Loss : effluent gases	13.1	14.0	6.2	2.7
	100.0	100.0	100.0	100.0

be made by someone experienced in the work, and thereby avoid repeating errors that have previously been made by others. The first step in contemplating an improvement would be to make a thorough analysis of present conditions and then consider the possible economies that could be secured based upon the results of installations already in operation, knowing that even such installations would not represent the ultimate that might be achieved by greater concentration of thought, coupled with experience.

BRITISH STEEL FOUNDERS' ASSOCIATION

The first technical convention on steel castings ever to be held in this country was organised by the British Steel Founders' Association. Appropriately it was staged in Sheffield, where the art and science of steel-foundry work was so largely developed. The convention opened with a dinner, over which Mr. Charles S. Gill presided. Present as guests were the Lord Mayor of Sheffield (Ald. C. W. Gascoine, J.P.); the Master Cutler (Mr. Eric S. Osborne); Sir Charles Goodeve, F.R.S. (director, British Iron and Steel Research Association); Mr. W. Leonard (Parliamentary Secretary to the Minister of Supply); Mr. T. Makemson, M.B.E. (secretary, Institute of British Foundrymen); Mr. J. G. Pearce, M.Sc. (director, British Cast Iron Research Association); Professor Andrew (Sheffield University); and Mr. V. C. Faulkner (Editor, F.T.J.).

This function was held on October 3. The following morning the delegates split up into parties to visit the works of David Brown & Sons (Huddersfield), Limited, at Peniston; Edgar Allen & Company, Limited; English Steel Corporation, Limited; Firth-Vickers Stainless Steels, Limited; Hadfields, Limited, and Samuel Osborn & Company, Limited. After luncheon, all these firms received a second party, whilst, in addition, the foundry of Wm. Jessop & Sons, Limited, was also open.

For tea the delegates were the guests of the Lord Mayor at a reception held at the town hall. In the evening, and on Saturday morning, round table discussions of technical topics were held.

NEW MAGNETIC FILTER

Philips Industrial (Philips Lamps, Limited) have produced a new type in their range of magnetic filters of interest to vitreous enamellers. The method of cleaning the filter has been radically altered to meet the special requirements of certain operations, such as grinding, where ferrous contamination is very heavy, and quick and easy cleaning is of first importance.

In this new design the magnet is situated in a special chamber which seals it off from physical contact with the operating fluid in the lubricating or coolant system; the trapping cages, however, are fully magnetised whilst the magnet is in this chamber. To de-magnetise the cages for cleaning purposes it is necessary only to lift the magnet from its housing by means of the ring provided. This can be accomplished without interference with any other part of the filter assembly or the circulating system. The contaminated cages which remain in the pipe-line assembly are de-magnetised as soon as the magnet is removed; thus the ferrous contamination can be quickly flushed from the filter cages by the circulating fluid.

A second outlet has been provided on this filter so that when it is being cleaned, the contamination can be drawn off into a separate draining bucket. This filter is suitable for systems with a capacity up to 700 g.p.h. Other sizes of filter will be available to deal with systems of larger capacity.

IRON AND STEEL INSTITUTE

AUTUMN MEETING, 1946

The autumn meeting of the Iron and Steel Institute will be held in the lecture theatre of the Institution of Civil Engineers, Great George Street, London, S.W.1, on Wednesday and Thursday, November 13 and 14. The following is the detailed programme:—

Wednesday, November 13

10.0 a.m.—Official business.

10.30 a.m.—Joint discussion on the following Papers: "The Influence of Port Design on Open-hearth Furnace Flames," by J. H. Chesters and M. W. Thring; "A Heat-flow Meter for Use in Furnaces," by R. H. Baulk and M. W. Thring; an introductory address on "The Purpose and Plan of the Experiments" will be given by J. H. Chesters, based on Section I, Parts 1 and 2, Section II, Part 8, of Special Report No. 37. Three aspects have been selected for consideration and will be discussed as indicated below:—

11.0 a.m.—"Special Instruments and Technique," based on Section I, Part 3, and Section II, Parts 1 to 7, 11, 13 and 14, of Special Report No. 37, and on the Paper by Baulk and Thring; introduced by Dr. J. H. Chesters.

2.30 p.m.—"Thermal Conditions within the Open-hearth Furnace," based on Section II, Parts 10 to 14, and Section III, Part 2, of Special Report No. 37; introduced by Mr. M. W. Thring.

4.0 p.m.—"General Conclusions," based on Section II, Part 9, and Section III, Parts 1 and 2, of Special Report No. 37; Mr. W. Geary will act as rapporteur.

Thursday, November 14

9.30 a.m.—"The Origin and Constitution of Certain Non-metallic Inclusions in Steel," by J. R. Rait and H. W. Pinder; "The Neutralisation of Sulphur in Cast Iron by Various Alloying Elements," by H. Morrogh. These two Papers will be discussed jointly.

10.30 a.m.—"The Removal of Hydrogen from Steel," by J. H. Andrew, H. Lee, A. K. Mallik and A. G. Quarrell.

2.30 p.m.—Discussion on "The New Annealing Plant for Steel Strip in Coils at the Whitehead Iron & Steel Company, Limited, Newport, Mon.," by B. Jones and I. Jenkins.

3.30 p.m.—Joint discussion on "The Protection of Iron and Steel against Marine Corrosion and Fouling," based on the following three Papers: "The Formulation of Anti-corrosive Compositions for Ships' Bottoms and Under-water Service on Steels—Part II," by F. Fancutt and J. C. Hudson; "Report on Anti-fouling Research, 1942-44," by the Marine Corrosion Sub-committee; "Interim Descriptive Statement on the 'Leaching-rate Test' for Ships' Anti-fouling Compositions," by the Joint Technical Panel on the Leaching-rate Test of the Marine Corrosion Sub-committee.

Buffet Luncheons

The buffet luncheons will be held in the hall of the London Missionary Society, 42, Broadway, London, S.W.1. The hall is on the ground floor of Livingstone Hall, which is at the Tothill Street end of Broadway, facing St. James' Park Underground Station. Tickets for the luncheon cost 6s. each for each day; members may buy tickets for any guests they may wish to invite on either or both days.

Film Display

A film display will be given from 8 p.m. to 9.30 p.m. on Wednesday, November 13, 1946, in the lecture theatre of the Institution of Civil Engineers. No tickets of admission are required. The following is the programme of films to be shown:—

"Open-hearth Furnace Flames," by J. H. Chesters, of the United Steel Companies, Limited. A record of flame characteristics and other aspects of the trials and experiments conducted in the open-hearth melting shop at Templeborough.

"The Control and Prevention of Distortion in Arc Welding," prepared by Walt Disney Productions and released by Lincoln Electric Company, Limited. A Disney character—Mr. Shrink—is used to illustrate how to minimise the effects of shrinkage and how to make shrinkage forces work to the welder's advantage.

"A Photographic Investigation of the Brightness of Liquid Steel Streams," by J. A. Hall, of the National Physical Laboratory. A short record of observations made by the National Physical Laboratory.

"The Measurement of Liquid Steel Temperatures," prepared by J. A. Hall, of the National Physical Laboratory, for the Pyrometry Sub-committee of the British Iron and Steel Research Association. A record of the technique of the quick-immersion thermocouple, showing the method of assembly and the ways in which it has been applied in different works and types of furnace.

(This programme is subject to alteration.)

PUBLICATIONS RECEIVED

Handbook of the Scientific Instrument Manufacturers' Association of Great Britain. Published from 123, Pall Mall, London, S.W.1. For private circulation only.

After a few pages of historical matter, there is an alphabetical list of apparatus made by the member firms of the association, and against each there is a list of numbers. These numbers refer the reader to the advertisement section, where one finds the names and addresses of the manufacturers. It is a sensible arrangement and is of distinct interest to those of our readers whose jobs are concerned with scientific control of processes. This class need not be put off by the "private circulation only" statement, for obviously the book is meant for them and export houses.

Metal Powder Report. Vol. I, No. 1. Edited by W. D. Jones and R. A. Hetzig. For private circulation only.

This 16-page pamphlet is giving for this newish industry of powder metallurgy a service similar to that made available by, say, Science or as Ceramic Abstracts. The large field now open to this branch of industry is shown by the grouping of the abstracts into cutting and abrading tools; bearings; engine parts; contacts; magnetic materials; electronic materials, metal spraying, and miscellaneous.

INFLUENCE OF RESIDUAL ELEMENTS ON THE PROPERTIES OF MALLEABLE CAST IRON

This Report, originally prepared by the Technical Advisory Panel to the Directors for Iron Castings, Ministry of Supply, was presented to the annual conference of the Institute of British Foundrymen at Birmingham. Below is given the substance of the Report in abstract.

The Malleable (Metal Compositions) Sub-committee was appointed in 1942 by the Technical Advisory Panel, to investigate difficulties which had arisen in connection with production of certain munitions components, especially tank-track links in whiteheart malleable cast iron. The experimental work involved in the committee's investigations was carried on by the British Cast Iron Research Association, under contract from the Ministry of Supply, and in a final report presented in 1945 all test results were fully presented. The present Paper comprises an extract of certain of these results, together with the general conclusions arrived at by the investigators, and the findings of the Sub-committee.

Terms of Reference

The terms of reference given to the Malleable (Metal Compositions) Committee were as follows:

(*a*) To explore the differences which have occurred in the properties of malleable castings produced from mixtures containing refined iron and those from mixtures containing hematite pig-iron and steel scrap.

(*b*) To investigate the influence of residual elements, which may be present in refined iron and hematite, used in the manufacture of malleable cast iron.

(*c*) To determine if, when burnt ingot-mould scrap is used in the production of refined iron, this adversely affects the casting properties of the molten malleable iron and has a deleterious influence on the properties of the annealed malleable castings.

Part I—Influence of Residual Elements

In the investigations reported, 23 batches of small pigs were cast, from hematite-steel-base and from refined iron-base irons, and alloy additions were made in the crucible. All conditions of production were closely standardised, to ensure complete comparability of castings. For the study of each element (nickel, copper, molybdenum, titanium, boron, arsenic and phosphorus) a series of four different compositions was made.

For the irons of each series curves were plotted, showing the influence of the respective residual elements on modulus of rupture, total resilience, total deflection, bend value and Charpy impact-resistance. The curves are reproduced in full in the report: for conclusions, see summary at the end of this abstract.

Part II—Differences Between Malleable Cast Irons Produced from Mixtures Containing Refined Iron and Mixtures Containing Hematite and Steel Scrap.

The main object of this section of the investigation was the determination of the extent to which the nature of the original mixture influenced properties (when both types were melted, cast and annealed under similar conditions), and to what factors any differences occurring could be attributed.

Conclusions

In applying the conclusions summarised below, the committee point out that they must be regarded as applicable only to material melted in the manner described in the report and annealed in a particular way. With regard to the influence of residual elements, the "hold" period of the annealing cycle is of primary importance, and in the experiments described this period was relatively lengthy, a fact which would tend to smooth out differences introduced by addition elements. From the results obtained it is considered possible to infer only to a limited extent the effects of various combinations of the residual elements. It is, however, believed to be safe to assume that the combined effects of the carbide-stabilising elements would be additive in the same direction, and that a similar assumption would be justified with regard to graphitisers. With regard to the combined presence of graphitisers and carbide-stabilisers, the members of the committee are "disinclined to postulate their combined effect using as a basis the popular 'graphitising values' given to the respective alloying elements."

Within the above limitation, the following conclusions are drawn:—

(1) The analyses of the materials supplied for investigation did not reveal any substantial differences between refined iron and hematite-base material in respect of their residual elements.

(2) Nickel in annealed whiteheart malleable can be present in amounts up to 0.3 per cent. without harmful effects.

(3) Copper up to 0.7 per cent. (maximum studied) had no adverse influence on the strength of the larger sections ($\frac{1}{2}$ in. to $\frac{7}{8}$ in.), but tended to reduce the ductility of the small sections ($\frac{1}{4}$ in).

(4) Chromium up to 0.2 per cent. did not have any harmful effect on the mechanical properties of the annealed material. With a shorter annealing cycle, lower silicon contents and higher sulphur contents, the dangerous chromium content may be lower.

(5) Molybdenum up to 0.2 per cent. (maximum studied) did not have any harmful effect on the mechanical properties. The effect may be more pronounced in the simultaneous presence of chromium.

(6) Additions of ferro-silicon-titanium and ferro-carbon-titanium did not have any marked influence on mechanical properties, but the graphitisation of the malleable iron was increased, as was also the tendency to mottle.

(7) Tin had a feebly harmful effect, but in amount

(*Continued overleaf, col.* 2.)

NOTES FROM THE BRANCHES

SHEFFIELD BRANCH.—The opening meeting of this branch was held at the Royal Victoria Station Hotel on September 29. Mr. W. H. Salmon, the retiring president, introduced Mr. F. E. Steele, of C. & J. Hampton & Company, Limited, who delivered his inaugural address. This he entitled, "What of the Future?" In abstract he said:

The foundry industry might rightly claim to be one of the oldest industries in existence, and it was certainly not the least interesting. Yet it was faced with a scarcity of interested youths. The position had been aggravated by public statements on isolated foundry conditions which had subconsciously relegated it to the lowest form of labour instead of being elevated to the highest and most important basis of engineering.

When it was considered that over 14 million tons of castings were produced in British foundries during the war, and almost every industry was dependent upon castings, such attacks showed crass ignorance of foundry work. To meet the needs of the future, mechanisation and reorganisation would be of great assistance in the foundry, but, the president suggested, a development of outlook by foundrymen was essential in order that they should realise that their job was not only important but was just as interesting as they themselves were interested in it.

With the task of reconstruction now facing the world, the future requirements from foundries would not only provide a regular job for the interested youth, but also plenty of scope for study in "cause and effect." He would, no doubt, be fascinated and sometimes dismayed by the "Big Three" that occasionally nullified his efforts to produce the perfect casting. The "Big Three" were blowholes, scabs, and shrinkage, and although their namesakes in actual life did sometimes walk out on each other, these "Big Three" never left one in such suspense, for they were always persistent in their efforts to make an appearance.

In the performance of his occupation, the foundry worker would continue to soil his hands, but it was encouraging to note that schemes were in progress for improving conditions in the foundry, and supplemented facilities for washing and changing, enabling him to return home as clean as the clerk or the draughtsman. This, he felt sure, would be much appreciated.

With the advancement of synthetic and welded structures, the demand for better-finished castings and higher specifications would be met by marrying the practical and scientific knowledge existing amongst the membership of the Institute together. As in the past, everyday problems concerning the foundry would continue to absorb the time and interest of the members, many of whom freely gave their services on various committees connected with development and research. X-ray photography was now used for detecting flaws in castings, and infra-red rays for drying cores. There was even some visual information as to what actually happens inside the mould during casting.

A book had recently been published on "Steel Castings" and to quote the author—"To those untiring men, the steelfounders of Sheffield, to whom I take off my hat for all they did during the war and will continue to do for the city and country that gave them birth." Sheffield has many worthy traditions to uphold in the foundry industry.

Finally, he advised all engaged in it, now and in the future, to realise that in making castings they were doing a job in which they could take pride, and also played no small part in the "Shaping of Things to Come."

The new president was cordially thanked by Mr. George Offiler and Mr. H. S. W. Brittain on behalf of the members. The remainder of the evening was taken up by a smoking concert.

BRISTOL AND WEST OF ENGLAND BRANCH.—The branch opened their 1945-46 session at the Grand Hotel, Bristol, on Saturday, September 21, with the showing of the Hadfield Steel Making Film. This was followed by high tea and social evening. A large attendance of members, wives and visitors spent a very enjoyable and pleasant time.

INFLUENCE OF RESIDUAL ELEMENTS

(*Continued from previous page.*)

up to about 0.1 per cent. in an otherwise good malleable iron its harmful effects may not be appreciable.

(8) Arsenic may be slightly harmful in amounts of the order of 0.1 to 0.2 per cent., but the effect is not pronounced.

(9) Small additions of boron (as ferro-boron), of the order of 0.003 to 0.004 per cent., may produce a marked increase in strength and graphitisation, but also tend to reduce ductility. It is not yet clear whether these effects are due to the alloyed boron, or to the deoxidising effect of the aluminium present in the ferro-boron used.

(10) Phosphorus tended to reduce the ductility of small sections and the shock-resistance of all sections, in the annealed condition. Its effects on other mechanical properties are not clear. Other factors being equal, the best mechanical properties are most likely to be obtained with the lowest phosphorus contents.

(11) The carbide-stabilising elements chromium and molybdenum tended to reduce the expansion of annealing in the larger sections and to increase the amount of contraction in the small sections. Tin and boron (in amounts greater than 0.1 per cent.) behave in a similar manner.

(12) The graphitising elements nickel and copper tended to increase the amount of expansion on annealing of the larger sections and to reduce the amount of contraction of the small sections. Phosphorus behaved in a similar manner. It is possible that titanium and boron (of the order of 0.003 to 0.004 per cent.) exert a similar graphitising effect.

No harmful effect was detected, as the result of the use of oxidised scrap in the preparation of refined iron, on the annealability and mechanical properties of the resulting malleable iron.

MANUFACTURING PROBLEMS

PRESIDENTIAL ADDRESS TO BIRMINGHAM FOUNDRYMEN

As usual the opening meeting of the new session of the Birmingham, Coventry and West Midlands branch of the Institute of British Foundrymen was the occasion of the presidential address. This year's president of the branch is MR. E. C. DICKINSON, M.Met., F.I.M., and in his address he dealt with the problems facing the industry.

Reviewing the present position, Mr. Dickinson thought that one of the outstanding problems facing the industry was the excess of the demand for iron castings over the output that was being achieved. Normal peace-time production had been replaced for over five years by the manufacture of wartime goods, and during that time plant, machinery, and finished goods in which castings were utilised, had been operating, wearing and becoming obsolete. To-day we had not only to provide for replacements for the five lost years, but also meet the new and heavy overseas demands.

Sustained Demand

There could hardly be any question of the present demand falling to pre-war level for many years to come. It would be very unwise to draw comparisons with the first world war and its post-war period. Then conditions were very different. Production of consumer goods was not so seriously affected, nor was the destruction of houses and goods so widespread as in the recent war. Further, in 1918, the industries of Europe were in a far better position to resume normal production than they were to-day. It was vitally important that the foundry industry should appreciate both the seriousness of the present shortage of iron castings, and that the present high demand was a lasting one. That made both short and long term plans to meet that demand essential. It was not a false demand but a very real one.

Man-power Problems

Examining some of the factors which were restricting present output, the president said the first problem that presented itself was that of man-power. While unskilled labour was reasonably available in some districts, there was a general shortage of supervision, of skilled men and youths. That shortage could only be overcome by attracting and training men and youths for the industry. It was generally appreciated within the industry that improved conditions and amenities were urgently needed. In that direction their President (Mr. D. H. Wood) had given a splendid incentive to fruitful thought in the F. J. Cook Award. The Institute and other industrial and scientific organisations connected with the foundry trade were doing splendid work in conjunction with individual firms in the development of training and apprenticeship schemes which would have far-reaching effects on the supply of skilled men and supervisors for the future.

Superimposed on the shortage of labour was the question of individual effort. One frequently heard it said to-day that output obtainable from a set of pattern equipment was not as great as it was before the war. Many factors contributed to the apparent lack of effort, which made itself felt in absenteeism and low output. Many foundries had a high percentage of green labour unused to foundry work. The continuance of food rationing might well be affecting the physical staying power of the workers, and the increasing time lost through sickness of the worker and his relatives at home. In addition, there was the natural reaction from the high pressure production of the war years. There was a reluctance on the part of employees to work harder and for longer hours in order to increase their earning power. There were many reasons for that, such as the effect of the present method of income-tax collection; the high rate of that tax; the lack of consumer goods, and even materials for hobbies. The elimination of those adverse factors was not easy, the problem being largely one for the various ministries. In spite of this, however, they must do all in their power to alleviate the post-war conditions which affected that and other great industries.

Expansion Difficulties

It was obvious that provision for the increased demand could be met by expansion and increasing the floor space of the foundries. Even after agreement with various ministries in regard to the site, possibly in a remote distressed area, and after obtaining the necessary building licence, one was faced with the problem of obtaining the necessary plant. Some of the essential items might mean a delivery period of up to two years, while the other problem was the building up of supervisors, and a skilled and unskilled labour force. They had been well trained in recent years to tackle serious difficulties, and when a wise course presented itself they would no doubt overcome the problems before them and follow the course they had chosen.

In addition to tackling those long term problems, it was necessary to develop an immediate and short term plan to increase output. That could only be achieved by each individual foundry improving its productive efficiency to the fullest possible extent by the use of the technical and engineering knowledge available. In the field of research the work of the British Cast Iron Research Association was of a high order, and there was good reason to believe that the mechanisation of graphite formation would shortly be fully understood, thus enabling the form and quantity of graphite to be closely controlled. That work was of fundamental importance to the foundryman, and in that field of research the Association was undoubtedly leading the world. The work of the technical sub-committees of the Institute was of immense value to the practical foundryman. Working in harmony those two bodies were capable of placing British foundries in a strong position from the point of view of technical development, but they must be prepared to make full use of the knowledge put into their hands.

Manufacturing Problems

Extra Shifts

By taking advantage of engineering development, foundry plants must be modernised. The utilisation of methods of mechanical handling, labour-saving devices, and all means of relieving the foundryman's work of as much heat, grime, and smoke as was possible, would not only improve efficiency, but would have a marked psychological effect on labour and the attraction of youth to the industry.

The obvious short term method of increasing output by shift working was full of difficulties, particularly for the mechanised foundry, which were perhaps not fully realised outside the industry. It was necessary to build up sufficient man-power for the second shift to deal with the minimum output of liquid iron from the furnaces, and to provide more supervision and maintenance personnel than would be required in a machine shop. Some items of plant might be already operating on overtime, or even on shifts, and those items must be duplicated before full shift working could be started.

In spite of those difficulties, however, every attention was no doubt being turned to the question of shift working as the most obvious short term means of meeting the demand for iron castings. In Birmingham, Coventry, and the Midlands that demand was as great, and probably greater, than in any other part of the country. He felt sure that, individually and collectively, the members of that branch of the Institute would tackle that problem wholeheartedly and successfully.

Vote of Thanks

On the proposition of Mr. J. Hird, seconded by Mr. N. C. Blythe, the president was heartily thanked for his address, and members then settled down to listen to Mr. K. H. Wright, with the co-operation of Mr. J. H. D. Hobson and Mr. C. Payne, deal with the Report of the Sub-committee, T.S.6, on "Control Tests in Cast Iron," which was given at the recent Birmingham conference of the Institute.

The president expressed his personal thanks to the trio of speakers, those of the members being proposed by Mr. J. L. Francis and seconded by Mr. H. H. Shepherd.

SAND-LINED MOULDS FOR CENTRIFUGAL CASTINGS*

The centrifugal casting of metals was developed in Germany to a degree comparable with that in the United States and rather beyond that in Great Britain. The methods and machines for production of cast-iron pipe—largest tonnage item of the field—were those in common use before the war. In fact, large new production facilities (Buderusche Eisenwerke, Wetzlar) were shut down early in the war, since they were not needed.

One significant development may prove to be an important contribution to the science of centrifugal casting: the use of thin silica sand lining on the mould face in the horizontal casting of gun barrels, high chrome steel tubing and steel cylinder liners. This application of the sand lining was developed by Dr. Poelzguter, and the technique was in use in several plants.

The casting of steel gun barrels was highly developed. Clean, round grain silica sand, of approximately 30 to 70 mesh, is used to line the mould face to a depth of approximately 5 mm. Too thin a lining, *e.g.*, 3 mm., is said to result in longitudinal cracks in the casting; whilst too thick a lining, *e.g.*, 7 mm., results in a tendency of the lining to wash, resulting in swells in the metal.

The method of placing the lining consists in dumping the sand from a trough, equal in length to the mould, after the mould has reached full speed. The mould used is of chrome steel, 1½ in. thick; and runs in a tank of water, being driven through a gear train. The machine tilts to an angle of 12 to 15 deg. during pouring of metal.

*From a report made by Dr. J. T. MacKenzie, American Cast Iron Pipe Company.

Some penetration of the sand by the molten steel takes place, which penetration, however, does not seem to result in lifting of the sand. The sand comes off the casting readily during subsequent heat-treatment.

Steel Tubing

Horizontal spinning of high chrome steel tubing, with wall thickness of 1 to 2 in., was also accomplished through the thin sand-lined mould. In this case, only 2 mm. thickness of silica sand was used on the mould face. The surface of the tubing appeared highly satisfactory, and with no apparent penetration of the sand.

In the manufacture of cast-iron automotive cylinder liners, the Germans used methods and equipment common in England. For steel liners, however, machines developed in Germany were almost identical with the latest types in the United States, incorporating the advantages of simple cylindrical shape of the mould—to ease thermal stresses—and removal from the mould after each cast, to allow better control of mould temperature and dressing of mould face.

Vertical spinning in was found to be apparently on a par with similar production in the United States, with the principles of directional solidification carefully observed.

Features of considerable interest in the casting of brass and bronze are the use of thin copper sheet as lining in cast-iron moulds, and a coke-oven gas atmosphere in the mould. The copper sheet is cut to exact size (allowing for expansion under heating by hot gas flames before pouring), and slipped into the mould immediately before casting. The mould is filled with the coke-oven gas before pouring, and gas atmosphere is maintained until solidification has been completed. The combination is designed to eliminate pin holes and add to the life of the mould.

CORRESPONDENCE

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

To the Editor of the FOUNDRY TRADE JOURNAL.

SOURCES OF HYDROGEN IN CAST IRON

SIR,—Mr. R. C. Tucker's theory outlined in his recent article and subsequent correspondence on the "Sources of Hydrogen in Cast Iron," appears to be based on the idea that water such as rain does not soak into the interior of pieces of coke, whereas water applied during the period when coke is at a high temperature is sucked in, and it is this portion of the total moisture which remains there until the coke reaches the melting zone in the cupola. On making enquiries it transpires that knowledge of this particular point is very hazy, and the matter has apparently not been systematically studied.

In order to determine experimentally what actually happens, coke was examined for rate of drying by first immersing in water and then heating at various temperatures in an oven such as is used for drying sand test specimens. The effect of increased temperature on the rate of drying is shown in Table A.

It should be noted that these times are exaggerated since each weighing means a break in the heating operation, and this is therefore greater at low temperatures. It did not seem worthwhile constructing a special balance so that the loss of weight could be measured without removing the test-piece from the oven. Then again the oven atmosphere does not reproduce conditions in the cupola where hot gases flow over the coke at a high speed. In order to meet this condition hot gases from a mould drier fired with cupola coke, were led through a duct, so that the test-piece could be suspended in a vertical position in a flow of cupola gases, with the temperature recorded with a pyrometer.

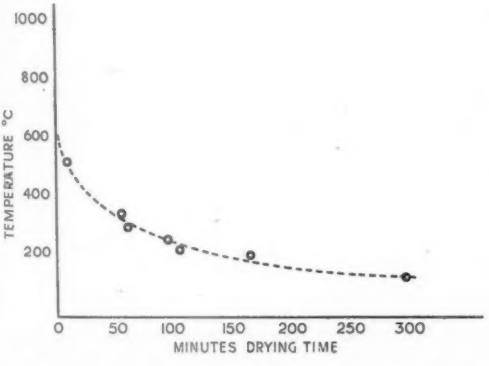

FIG. A.—EFFECT OF INCREASING TEMPERATURE ON DRYING TIME.

In this way a temperature of 526 deg. C. was readily maintained. A higher temperature than 526 deg. C. was not attempted because combustion might begin soon after this temperature and this would complicate the measurement of moisture by loss of weight. At 526 deg. C. the coke was heated throughout and then immersed in cold water when it absorbed 44 per cent. moisture, this in turn dried off in less than 9 mins. at 526 deg. C.

Table A.—Showing the Rate of Drying of Saturated Cupola Coke at Various Temperatures.

Average drying temp. deg. C.	Percentage water absorbed.	Time taken to reach 2 per cent. H_2O (mins.)	Time taken to reach 0 per cent. H_2O (mins.)	
128.7	39.6	225	300	
204.4	52.8	125	165	
231.5	40.9	64	105	Oven tests
261.0	40.9	66	95	
304.0	40.9	37	60	
359.0	39.4	34	55	
526.0	44.0	—	9	Dried in cupola gases

This total absorption was verified by sinking coke in water under the influence of a vacuum pump. It is suggested here that the moisture absorption found is the limit, and one which will never be encountered in works practice, however, using the drying times got from the low temperature experiments as a guide, and plotting these in the graph, and projecting the graph along the normal direction, leads us to the conclusion that, with a drying temperature of 630 deg. C. in the cupola gases, the time required to dry the coke absolutely would be nil. That is to say that all the moisture would be gone before the coke reached a temperature of 630 deg. C. throughout.

The drying of coke at 526 deg. C. in 9 mins. is sufficient to prove the writer's argument that moisture in coke plays no part in the absorption of gases in metal, since it does not reach the melting zone.

It is interesting to note the corroboration of Mr. Tucker's point regarding the suction effect when quenching hot coke. This causes a considerable increase in the moisture absorbed as against the same piece of coke dipped cold. For example, a normal close-grained piece of Durham coke absorbed 4.5 per cent. moisture when dipped cold, in which case it readily floated, whereas the same piece of coke when dipped at a temperature of 306 deg. C. absorbed 40.77 per cent. moisture, and immediately sank in the water. But even with this excessive quantity of water, complete drying is accomplished in the highest regions of the cupola burden.

The other point on which discussion might be continued is Mr. Tucker's suggestion that water can be

Sources of Hydrogen in Cast Iron

trapped in coke during quenching at the coke ovens, that is some water gets in but cannot get out due to the sealing of the pores, even when heated above 700 deg. C. This suggestion is unacceptable because it assumes that the material is still plastic when cold, whereas coal loses its plasticity in the process of becoming coke. Pores filled with steam would under the influence of the hot cupola gases soon be cleared due to rapid diffusion.

Careful measurement of true and apparent density of the coke under examination, and direct calculation of the air spaces or volume voids gave a figure of 40 per cent., which would in turn represent a possible absorption of 40 per cent. of water. This, by comparison with the absorption of water obtained, shows clearly that no closed pores exist, and the water is free to get in and out with change of temperature.

A visiting foundryman from India recently stated that the gas hole trouble was quite definitely more troublesome in the monsoon season. This is interesting as such confirmation of the effect of moisture in the air, although not so easy to demonstrate in parts of this country where by all reports the wet and dry seasons are virtually the same, is none the less important, whilst moisture in coke is, in the writer's experience, not important at all.

Yours, etc.,

W. Y. BUCHANAN,
Foundry manager,
John Lang & Sons, Limited.
"Dunconnell," Thomson Avenue,
Johnstone, nr. Glasgow.
September 19, 1946.

FORTHCOMING EVENTS

(Secretaries are invited to send in notices of meetings, etc., for inclusion in this column.)

OCTOBER 15.

Sheffield Metallurgical Association:—"Overheating Symposium." At the Metallurgical Club, West Street, at 6.30 p.m.

OCTOBER 16.

Institute of Welding (North London branch):—"Development of the Modern Electrode," by Dr. J. H. Paterson. At the Technical College, Acton, at 7.30 p.m.

OCTOBER 17.

Institution of Mechanical Engineers:—Annual dinner.

OCTOBER 18.

Association of Special Libraries and Information Bureau (Northern branch):—"Information Service and the Export Trade," by Mr. A. B. Agard Evans. At Hornby Library, William Brown Street, Liverpool, 3, at 3 p.m.

Institution of Mechanical Engineers:—General meeting. Presidential address. At the Institution, at 5 p.m.

Institute of British Foundrymen

OCTOBER 12.

West Riding of Yorkshire branch:—Presidential address. "Parablast Cupola," by Mr. H. Taft. At 1, Mannville Terrace, Bradford, at 5 p.m.

Burnley section:—Film: "The Production of High Quality Steel," followed by discussion. At the Accrington Technical School, Accrington, at 6.30 p.m.

Scottish branch:—Presidential address. "The Influence of Design and Pattern-making on Foundry Technique, and the Development of Competitive Methods of Production of High Duty Castings," by Mr. T. H. Sneddon. At the Royal Technical College, Glasgow, at 3 p.m.

OCTOBER 14.

Sheffield branch:—Discussion of "The Manufacture of 'Grand Slam' Bombs." At the Royal Victoria Station Hotel, Sheffield, at 7.30 p.m.

OCTOBER 15.

Slough section:—Films: "Steel," "Plan for a Foundry," and "Looking Through Glass." At the Lecture Theatre, High Duty Alloys, Limited, Trading Estate, Slough, at 7 p.m.

A ONE-OFF JOB

By "TRAMP"

Castings are occasionally required from jobbing foundries which are long and narrow, and for which no suitable box equipment is available. In such cases it is usual to mould in the floor and to carry the top in a number of smaller boxes if one large one is not in stock.

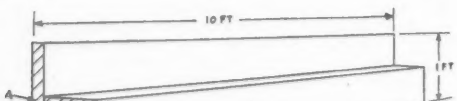

FIG. 1.

Sometimes, for structural work, where surface finish is not required to be of the highest order, top boxes can be dispensed with and the job cast open sand. A casting, such as that shown in Fig. 1, was urgently required and no box parts were available for its manufacture by orthodox means. As face A was to be built into a masonry structure it was decided to cast open sand with this face up. A pattern was constructed, as in Fig. 2, in which piece, B, was loose, being kept in position by button-headed screws C.

The method of moulding was first to excavate a pit in the foundry floor of sufficient size for the pattern to be easily accommodated and accessible to the moulder, as in Fig. 3. The pattern was then levelled in the pit and the side D rammed, the sand being reinforced with a number of bars, E. Button-headed screws, C, being removed, the main portion of the pattern was withdrawn and the piece, B, drawn back into the space, G. The pattern was then returned to its former position and the mould completed in the ordinary way.

FIG. 3.

FIG. 2.

MANUFACTURE OF STEELWORKS PLANT

POTENTIAL DEMANDS AT HOME AND ABROAD

The Steel Works Plant Association, in conjunction with the iron and steel industry, is setting up a joint committee to agree policy. Besides the plant makers, the principal contractors of the steel industry, electrical equipment manufacturers, and others are represented on the joint committee. It is hoped that this policy committee will appoint a number of small technical panels or sub-committees to discuss, with the steel-makers, technical problems pertaining to particular fields.

The capacity of the S.W.P.A. has been examined and an accurate survey of the total tonnages of plant produced during the years 1943-44-45 carried out. This discloses an average total output by the members of the Association of 23,000 tons per annum, representing approximately £3,500,000; this was achieved with very little sub-contracting, a source of production which is now becoming available and which the plant manufacturers hope to use to the fullest extent. Members of the Association are now expanding and modernising their capacity. Every effort is being made to obtain early delivery of necessary machine tools from British manufacturers, from Government surplus disposals, and in the form of reparations from Germany. With their own modernisation and extensions, which are in many cases far advanced, and the new tools, it is hoped to get from disposals and reparations, the plant manufacturers estimate that their output will be increased to approximately 35,000 tons, providing the necessary skilled labour can be obtained.

On October 2, the Steel Works Plant Association gave a dinner at the Mayfair Hotel, London, to Mr. John Wilmot, M.P., Minister of Supply.

Mr. C. U. Peat, chairman of the Association, who presided, said that they required all possible assistance from the Ministry of Labour both in procuring labour in the United Kingdom and in some cases in obtaining German technicians. If they got what they required, the increased capacity would be available by the spring of 1948.

Raw Material Problems

Raw materials were one of their headaches and they were having difficulty over the long-term delivery dates for major castings. To reduce this problem to a minimum, every opportunity was being taken by plant makers of substituting fabricated welded assemblies in place of castings, but it remained essential that a regular supply of raw materials, particularly castings, should be available.

The plant manufacturers, said Mr. Peat, were most anxious to arrange their programmes to meet the great demands which would be made on them by the iron and steel industry. They hoped that the industry would shortly be in a position to outline its short and long term programmes and indicate the relative priority of the different schemes. The reason for this urgency was that the S.W.P.A. was being almost swamped with orders from all over the world. If there was delay, their capacity might be diverted to meeting such demands, leaving little margin for important orders at home which seemed so long in taking definite shape.

The steelworks plant industry went through a lean period between the two wars, the chairman continued. It found itself hopelessly competing with the heavily subsidised German industry; this resulted in a vicious downward spiral in which reserves were depleted and little new capital became available for modernisation. They realised that the present position was full of promise and that a great opportunity existed for British plant to find its right position in British industry. They intended to play their part. They only asked for the co-operation of their customers and of Government departments, whose assistance in certain vital respects was essential.

Mr. Wilmot, replying to the toast proposed by the chairman, said that the iron and steel industry could not be modernised without an efficient steelworks plant industry. The Minister paid tribute to the work done by British manufacturers to meet the abnormal war-time demands for specialised plant. With regard to the future, the main certainty was the heavy volume of work ahead, both in this country and to obtain and hold a footing in the world markets. To meet the demand, there must be active co-operation between the plant manufacturers, the heavy-gear makers, and B.E.A.M.A., representing the heavy electrical plant makers, in order to co-ordinate the available capacity of all three industries. He promised all the help he and the Ministry could give.

INCREASED PRICES FOR ALUMINIUM PRODUCTS

The British Aluminium Company, Limited, announce that, owing to the recent increase in the price of virgin aluminium and to further increases in production costs, prices for raw and fabricated aluminium products have had to be adjusted accordingly. The new prices apply to virgin aluminium alloy ingots, virgin aluminium hardeners, pure aluminium and aluminium alloy rolling slabs, extrusion billets and wire bars despatched on and after September 16, and to sheet, coiled strip and circles, extrusions, drawn sections, tubing and wire, hot-rolled rod, slugs, etc., in pure aluminium, aluminium-manganese (BA.60) alloy and certain other alloys despatched on and after October 14.

Prices for extrusions, tubing and wire have now been logically related to present-day fabricating facilities and production costs in a similar manner to prices for sheet, coiled strip and circles introduced on March 1 last. Except for the change corresponding to the reduction in price of virgin aluminium in 1945, prices for these materials had not been adjusted to conform with increasing production costs since 1940.

VICKERS-ARMSTRONGS, LIMITED, are to modernise their shipyards at Barrow-in-Furness at a total cost of £2,250,000.

ENGINEERING PRACTICE AND FUTURE POLICY

CONFERENCE OF COMMONWEALTH INSTITUTIONS

An important event in the history of British engineering took place in London during the fortnight September 14-28, when a joint conference of representatives of Commonwealth engineering societies was held to discuss matters of mutual interest. The visiting engineers had readily accepted invitations from the three main engineering institutions in Great Britain, the Civil, Mechanical and Electrical Institutions. The conference covered a wide range of topics, and a marked unanimity of aims was established, with a clearer delineation of many common objectives. The proceedings were entirely informal. The representatives were senior officers of the institutions concerned, able to communicate the views of their societies and to carry back the recommendations drawn up at the conference as subjects for further debate.

The overseas guests were as follow:—T. H. Upton and W. R. Hebblewhite, of the Institution of Engineers, Australia; J. B. Hayes and Dr. L. Austin Wright, of the Engineering Institute of Canada; Rai Bahadur P. R. Agarwal and J. Chambers, of the Institution of Engineers, India; C. W. Hamann and D. B. Mansergh, representing the New Zealand Institution of Engineers, and Prof. W. G. Sutton and A. J. Adams, on behalf of the South African Society of Civil Engineers, Institution of Engineers and Institute of Electrical Engineers.

The delegates expressed their conviction that great strides had been made at the conference towards the co-ordination of the work of all the industries represented. Members of the home Institutions welcomed the fresh viewpoints that the overseas visitors brought to bear on the problems discussed, many dealing with matters which had long engaged the attentions of the Councils concerned. The business meetings alternated with a number of tours and visits, including the National Physical Laboratory, the Royal Naval College at Greenwich, and the G.P.O. research establishment at Dollis Hill. The personal contacts made possible during this period have further strengthened the ties existing not only between the home country and the individual units of the Commonwealth, but also between each and all of its constituent nations. The next conference will take place in South Africa.

ALUMINIUM SHORTAGE DENIED

Mr. Horace Clarke, president of the Aluminium Development Association, speaking at a luncheon given by leading members of the aluminium industry to Sir Edwin Plowden on the occasion of the knighthood recently conferred in recognition of his services as Chief Executive of the Ministry of Aircraft Production during the war, said that recent stories of an aluminium shortage were completely unfounded. If there were a shortage at all, it was merely local shortage of labour. The aluminium industry, he said, was in a healthy position and capable of meeting any demands upon it which could at present be foreseen.

SUBSIDY FOR FUEL OIL CONSUMERS

ZONAL PRICE SYSTEM REINTRODUCED

The Minister of Fuel and Power announces that arrangements have been made with the Petroleum Board to include on their invoices a deduction of 1d. per gall. in respect of all deliveries of fuel oils made after September 30. Similar arrangements have been agreed with the suppliers of tar fuel oils who sell these fuels direct to consumers. It will not generally be necessary under these arrangements for a consumer to apply for the subsidy, as he will automatically receive the benefits to which he is entitled interprice.

It is also proposed to revert to the normal peacetime zonal system of price and to eliminate the wartime difference in treatment as regards quantity rebates for old and new consumers. Before the war, consumers in the immediate neighbourhood of the main importing centres, where the costs of distribution are naturally less, received a price advantage of ½d. a gall. and consumers in intermediate areas a price advantage of ¼d. a gall. as compared with consumers in the remoter areas. Consumers were also granted rebates (maximum —1d. per gall. in 1939) in respect of quantities consumed. The Petroleum Board, with the approval of the Ministry of Fuel and Power, is now reintroducing the zonal system of prices which was a feature of the pre-war price system, and will grant quantity rebates to all consumers buying more than 100 tons of oil per annum. Broadly speaking, the zones and zonal allowances are the same as they were before the war, consumers in the immediate neighbourhood of importing centres receiving a price advantage of ½d. per gall., etc., and those in the intermediate zone a price advantage of ¼d. per gall.

As regards quantity rebates a sliding scale is to be adopted, based on the quantities delivered to each consumer in each yearly period, commencing October 1. All buyers will pay the full zone price on the first 100 tons; ¼d. per gall. rebate will be allowed on the next 900 tons; ½d. per gall. on the next 9,000 tons, and ¾d. per gall. on any quantity in excess of 10,000 tons. Where a consumer draws supplies in various areas his total purchases will form the basis for the assessment of the rebate.

SIR WILFRID AYRE JOINS IRON AND STEEL BOARD

The seventh member of the Iron and Steel Board is to be Sir Wilfrid Ayre. He is chairman and managing director of the Burntisland Shipbuilding Company, Limited, chairman of Hall, Russell & Company, Limited, shipbuilders, engineers, etc., of Aberdeen, and of National Shipbuilders Security, Limited, while he is also on the board of R. & W. Hawthorn Leslie & Company, Limited, Shipbuilding Corporation, Limited, and Marine Propulsion, Limited.

Earlier this year Sir Wilfrid led the mission representing the British shipbuilding industry which went to South America.

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1. Core being lowered into mould
2. Pouring the metal
3. Finished casting in transit

The STANTON IRONWORKS COMPANY LIMITED
NEAR NOTTINGHAM

NEWS IN BRIEF

THE ADDRESS OF Felco Hoists, Limited, is now at 17, Victoria Street, London, S.W.1.

THE OFFICES of the Iron and Steel Board have been established in Bush House, Strand, London, W.C.2.

A £2,250,000 MODERNISATION SCHEME is to be carried out at the Barrow shipyard of Vickers-Armstrongs, Limited.

RECENT ORDERS received by International Combustion, Limited, include Hum-mer screens to screen foundry sand.

THE GRAHAMSTOWN IRON COMPANY, LIMITED, are to provide additional cloakrooms, ablutions and a canteen at their foundry at Falkirk at a cost of £5,000.

GREENWOOD & BATLEY, LIMITED, electrical and mechanical engineers, of Leeds, intend to redeem on April 1, 1947, the £100,000 of 5 per cent. debentures at the price of £110.

KIDDERMINSTER TOWN COUNCIL have agreed to sell for £6,080 a site of nearly 17 acres to Johnson, Matthey & Company, Limited, precious-metal smelters, refiners and engineers, of Hatton Garden, London, E.C.1.

THE 1,800 WORKERS of the Hyde Park, Glasgow, works of the North British Locomotive Company, Limited, who had been on strike for 11 days, returned to work on September 27, pending negotiations of the issues in dispute.

TWO MEN WERE INJURED in an explosion at the works of G. & J. Weir, Limited, Holm Foundry, Cathcart, Glasgow. The cause of the explosion is understood to be the bursting of a cylinder of compressed acetylene gas in the welding shop. The fire which followed was quickly subdued.

THE HILLSIDE FOUNDRY & ENGINEERING COMPANY (CUPAR), LIMITED, of Cupar, Fife, have taken over Abertay Works, Tayport, previously governed by Henry Balfour & Company, Limited, of Leven, for the purpose of expanding their boiler-plating, welding and ironfounding activities.

THE SHIPBUILDING AND SHIPREPAIRING INDUSTRY (including the barge-building and barge-repairing industry) will be withdrawn from the scope of the Essential Work Order by the end of the year. Until individual removal from the schedule takes effect, the provisions of the Order remain in force.

ACCORDING TO A U.S. Iron and Steel Institute report for 1945, the accident rate within the steel industry was 7.23 per million man-hours, which moves the steel industry from fifth to fourth place on the list of safe industries. The accident rate for all industries was 13.63 per million man-hours.

THE FORD MOTOR COMPANY, LIMITED, has entered into a working arrangement with Ransomes, Sims & Jefferies, Limited, of Ipswich, for the provision of mounted agricultural implements which will operate exclusively with the Fordson Major tractor. The technical and manufacturing resources of each company have been placed at the disposal of the other.

THE BRITON FERRY STEEL COMPANY, LIMITED, have turned over a number of their furnaces and boilers to oil burning in place of coal. The move was urged upon them by the Ministry of Fuel and Power "owing to a feared acute shortage of coal fuel during the coming winter," says Col. J. M. Bevan, chairman of the company, in his statement in the annual report.

ALUMINIUM COOKING UTENSILS, nails and staples of all kinds (including hob-nails and boot and shoe studs), bolts and nuts of all kinds other than precision nuts and bolts, precision screws and other precision turned parts of metal, and iron and steel rivets are among the latest list of commodities which may be imported from all countries now participating in token imports.

THE FOLLOWING COMPANIES have been accepted as members of the British Cast Iron Research Association, the name of the representatives being shown in parentheses:—Frank Callinan & Sons, Pty., Limited, Sydney, Australia (Mr. S. J. Callinan); Greysham & Company, Delhi, India (Man Singh Vij), and Vulcan Foundry, Limited, Newton-le-Willows, Lancs (Mr. H. H. Saunders).

THE NORTH-EAST AREA COMMITTEE of the Association of Scientific Workers has convened a conference on "Science and the Public Welfare" to be held at the City Memorial Hall, Sheffield, on November 16 and 17. Prof. P. M. S. Blackett, F.R.S., of Manchester University, Prof. J. D. Bernal, F.R.S., of London University, and Dr. J. Rotblat, Director of Atomic Research, Liverpool University, will be among the speakers.

AS FROM SEPTEMBER 25, the territory of the U.S.S.R. as at December 31, 1938, ceased to be treated as enemy territory for all purposes of the Trading with the Enemy Act, 1939 (including the Trading with the Enemy (Custodian) Order, 1939), and it is no longer an offence under the Act to trade within such territory with any person carrying on business therein. Portuguese Timor has also ceased to be treated as enemy territory for all purposes of the Act. Russia was brought within the scope of the Trading with the Enemy Act when parts of the country were occupied by the enemy during the war.

THE ANNUAL REPORT of Irish Steel, Limited, states that the manufacture of steel from imported billets was carried on during a part of the year only, and mainly at a time when supplies of imported steel at comparatively low prices were available for sale in the country. As a result of this competition the steel manufactured by the company had to be sold at a price which did not provide for overhead expenses, which were not recovered out of the year's revenue. Owing to the difficulty of securing the services of skilled operatives, it was not possible during the year to operate the company's steelmaking plant. Since the date of the accounts, the company has engaged the necessary technical staff to operate this plant, and the first open-hearth furnace has been in production for the past few months. The second open-hearth furnace is expected to be completed shortly.

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PERSONAL

MR. H. L. ROBERTS has resigned from the board of B. & F. Carter & Company, Limited, machinery makers, of Bolton.

LIEUT.-COL. W. R. S. HODGSON has, after seven years' war service, resumed his duties as manager of the Lead Industries Development Council.

MR. J. C. REID has retired after over 63 years' service with the Carron Company, Carron, Falkirk, where he was an ironmoulder for 59 years.

MR. JAMES E. MACLAREN has been appointed managing director of B.S.A. Tools, Limited, and its subsidiaries. He will take up his new duties on November 1.

MR. ARTHUR R. KNOWLES, O.B.E., has resigned his position as director of the Joint Iron Council on his appointment as secretary of the Association of British Chambers of Commerce.

MR. BARTON D. BAKER, a director of Baker Perkins, Limited, manufacturing engineers, iron and steel founders, etc., of Peterborough, is at present on a business trip to the United States.

MR. AND MRS. JOHN T. EVANS, of Coseley, Staffs, recently celebrated their golden wedding. Mr. Evans has been employed by Thomas Green & Company, Coseley Foundry, for the past 60 years.

MR. H. H. BERRESFORD, managing director of the Staveley Coal & Iron Company, Limited, is to make a business trip to the United States. He will be accompanied by the company's director of research, DR. J. E. HURST.

MR. E. CARR, building engineer to the Copper Development Association, has received the first award of the Vokes Presentation for his lecture on "The History of Copper" to members of the London Association of Engineers.

MR. WILLIAM STEWART, who resigned his position as secretary of Stewarts and Lloyds, Limited, in 1943, is resigning his directorship at his own request on November 30, on which date he will have completed 49 years' service with the company.

DR. A. L. NORBURY has resigned from the Ministry of Supply in order to join the firm of Arthur J. Harris & Company, Limited, spice and pepper importers and grinders, of Great Crosby, Liverpool, and their associated company, Dehydrators, Limited, as technical director. His new home address is "The Dunes," Warren Road, Blundellsands, Liverpool, 23.

LIEUT.-COL. E. K. SCOTT, of Dorman, Long & Company, Limited, who has been awarded the O.B.E. for gallant and distinguished services in Malaya in 1942, is a member of the Government-sponsored goodwill trade mission to China. He represented Dorman, Long & Company in China from 1932 to 1938, and after undertaking a mission to Turkey for the company, he was at the Middlesbrough works until mobilised on the outbreak of war.

MR. C. E. HOYT, who, in nearly 30 years' service to the American Foundrymen's Association, has held the offices of secretary, convention and exhibits manager, executive vice-president and treasurer, has retired. MR. W. W. MALONEY, who has been secretary of the Association since August, 1945, has been elected secretary-treasurer. The Association also announce the appointment of MR. S. C. MASSARI as technical director and of MR. J. P. MULLEN as assistant treasurer.

Wills

MARSTON, SIR CHARLES, chairman of the Villiers Engineering Company, Limited £257,200

MENZIES, JOHN, formerly a director and secretary of Arthur Lee & Sons, Limited, steelmakers, of Sheffield £25,529

UNITED KINGDOM TIN POSITION

The Ministry of Supply has released the following figures showing the United Kingdom tin position for the month of August:—

	Ministry.	Consumers'.
	Long Tons.	Long Tons.
TIN METAL:—		
Stocks at August 1	9,658	3,498
Arrivals	—	—
Production	2,289	—
	11,947	3,498
Deliveries:		
To U.K. consumers .. 2,431	—	2,431
For export 249	2,680	—
		5,929
Consumption	—	1,885
Stocks at August 31	9,267	4,044*
TIN ORE (Tin Content):—		
Stocks in U.K. at August 1	6,935	
Stocks in U.K. at August 31	9,049	

* Calculated. Reported 3,771 tons.

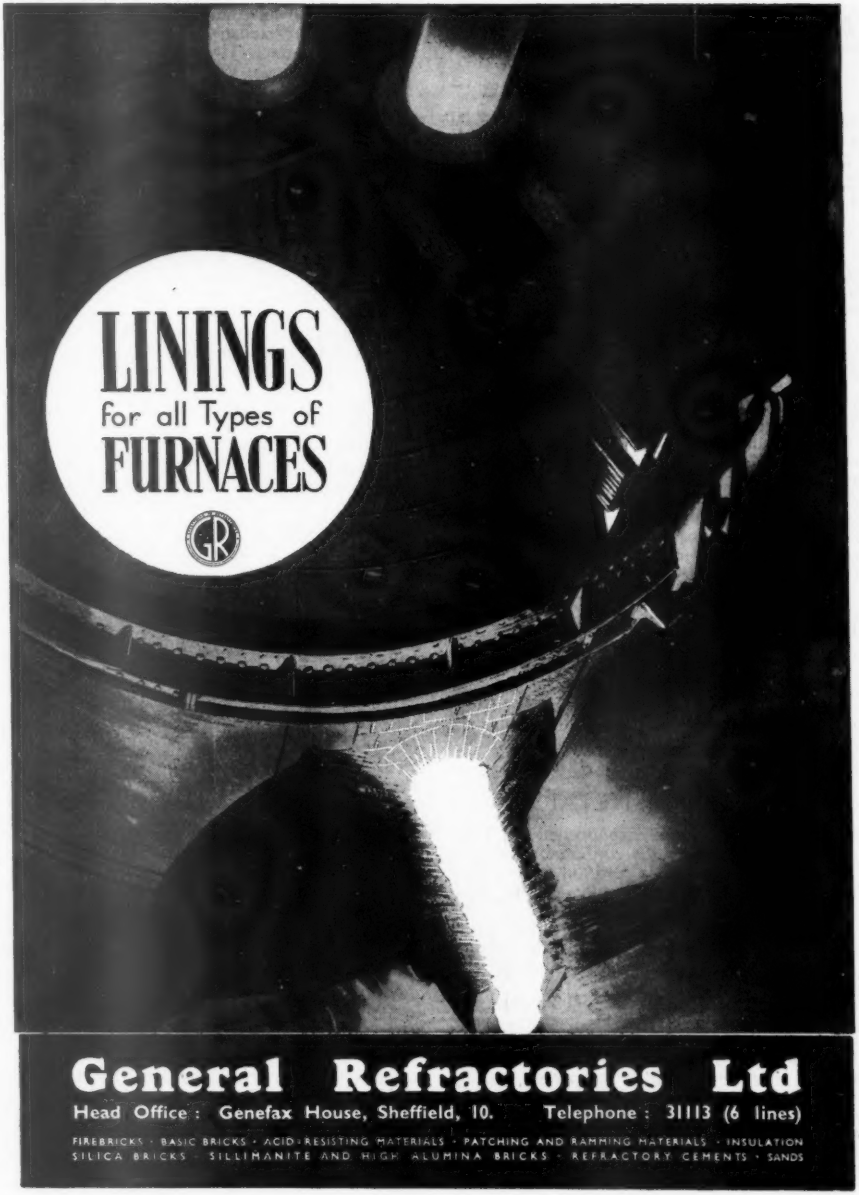
CONTRACTS OPEN

Any date given is the latest on which tenders will be accepted. The address is that from which forms of tender may be obtained.

Londonderry, October 18—Construction of a main sewer and outfall of approx. 1,238 yds. of 24-in., 15-in. and 12-in. dia. pipes in steel, concrete, stoneware and cast iron, complete with manholes, etc., for the Town Council. The City Engineer, 5, Guildhall Street, Londonderry. (Fee £3 3s., returnable.)

Plympton—Construction of a 16-in. spun-iron main (concrete lined), for the Plympton St. Mary Rural District Council. Mr. P. T. Loosemore, clerk, Council Offices, Plympton, South Devon.

Stranraer, October 18—Supply, laying, and jointing 325 yds. of 6-in. dia. and 210 yds. of 9-in. dia. fireclay sewer, and 680 yds. of 4-in. dia. cast- or spun-iron water pipes, for the Wigtownshire County Council. Mr. A. Merrilees, Douglas House, Newton-Stewart, Wigtownshire.



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Raw Material Markets

IRON AND STEEL

At the beginning of the fourth period there are fewer blast furnaces in operation than there were three months ago and present and prospective requirements emphasise the need for bigger outputs of pig-iron. The call for more high-phosphorus iron for the light-castings trade is specially insistent, and ways and means of meeting this demand will have to be improvised if the housing drive is not to be hamstrung by a shortage of builders' castings. There has also been an acceleration of activity in the engineering and jobbing foundries, with a corresponding expansion in the call for hematite, low- and medium-phosphorus iron, while export orders already booked will suffice to absorb any surpluses of refined iron during the current quarter.

Makers of crown bars are still in a position to accept further business for delivery in Period IV, but strong support is forthcoming from the shipyards and outputs of best bars and No. 3 and No. 4 iron are well booked to the end of the year.

Rather better supplies of billets, sheet bars and slabs have been forthcoming during the past week or two, but anxieties in this connection still persist and re-sellers are as keen as ever to acquire any form of defective material which may come on offer. Even defectives, however, are by no means plentiful and it would appear that there is no alternative to the acquisition of increased tonnages of semi-finished steel from overseas, to keep the re-rolling mills in full production.

Licences for the export of finished steel products during the ensuing three months are being issued very sparingly, requirements of important home industries being too urgent to be neglected.

NON-FERROUS METALS

The International Tin Conference opened on Tuesday in London, the object of the conference being to consider the prospective world tin position and whether any continuous inter-governmental study of that position is necessary. Mr. George Archer, of the Ministry of Supply, headed the British delegation, while delegations were also appointed by the Belgian, Bolivian, Chinese, French, Netherlands, Siamese and United States governments.

Mr. John Wilmot, M.P., Minister of Supply, who opened the conference, said the loss of the great tin-producing areas in the East during the war was a very serious blow, but by reason of the efforts which were made by producers in other countries, and by careful husbanding of stocks and new supplies by restrictions on consumption, the world just managed to pull through, although not without a great deal of inconvenience. We were now looking forward to the time, in the not too distant future, when we might again hope to have ample supplies of the metal freely available to consumers all over the world.

The Combined Tin Committee has reviewed the supply requirements position for tin metal for the second half of 1946, and has recommended the following allocations (figures in long tons):—Argentina, 70; Austria, 200; Brazil, 200; Canada, 1,200; Ceylon, 40; Chile, 25; Czechoslovakia, 600; Denmark, 240; Egypt, 175; Finland, 120; France, 4,000; Greece, 80; Hongkong, 75; India, 2,000; Iran, 25; Italy, 800; Middle East (excluding Egypt and Iran), 150; Mexico, 25; Norway, 120; Poland, 360; Switzerland, 640; Sweden, 200; South American countries (not elsewhere specified), 150; U.S.A., 6,400; Yugoslavia, 160. Details for the Middle East (excluding Egypt and Iran) and South American countries (not elsewhere specified) will be published later.

In general, supplies may be obtained from the following sources:—Belgian, British or Dutch sources, South Africa and Japanese stocks in the United States. For the Latin-American countries, however, the U.S.A. is an additional source for limited quantities, and supplies will also be available to France from French Indo-China and to the U.S.A. from China. The stocks of Japanese tin mentioned above were discovered by the occupation forces and shipped to the U.S.A. for inspection and sorting prior to allocation by the Committee. Most of the above allocations are interim only and the Committee expects to make a further review of the position early in November.

Consumption of virgin copper in the United Kingdom in August was 25,030 tons, according to figures issued by the British Non-ferrous Metals Federation. Copper scrap consumption amounted to 12,254 tons. It would seem that the Ministry of Supply will be hard pressed to find supplies of copper sufficient to cover the present rate of consumption. U.S. consumption of copper during August was at the highest rate for the past 18 months. Figures compiled in the trade showed a copper content of 119,644 tons in August deliveries of products from brass mills, wire mills and foundries. August consumption represented an increase of 22,901 tons over the July figure of 96,743 tons.

OBITUARY

MR. STEPHEN WALKER ELSHAW, who has died at the age of 79, retired in 1942 from the business of James Elshaw, brassfounders, which was founded by his grandfather in 1840.

MR. EDWARD POOL, secretary and general manager of Cooper Bros., Limited, ironfounders and textile engineers, of Burnley, died recently. He had been with the company for nearly 40 years.

LIEUT.-COL. HAROLD EDWARD TWENTYMAN, chairman of Henry Rogers, Sons & Company, Limited, exporters and machinery merchants, etc., of Wolverhampton, and a director of Rogers, Twentyman & Company, Limited, iron and metal merchants, etc., of Leadenhall Street, London, E.C.3, has died at the age of 77.